Gateways and Corridors: Ten Messages

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1. INTRODUCTION

In May 2007, a conference in Vancouver explored the issues, opportunities and challenges facing the operation and development of gateways and corridors in transportation networks. As a conference participant, my assigned role was to provide a presentation that summarized the proceedings: no easy task given the quantity and quality of the presentations. Rather than presenting a factual summary of each paper or presentation this paper attempts to articulate and discuss some key themes in the conference, creating along the way, ten messages concerning gateways and corridors that sum up much of what I learned and thought about at the conference.1

The paper begins by reviewing briefly the impetus for the current interest in gateways and corridors. Section 3 considers some issues related to theoretical analysis and section 4 discusses some elements of the current reality with respect to the evolution of transportation networks and global supply chains. Section 5 outlines several topics related to government involvement with the development, expansion and operation of gateways and corridors. The paper concludes with a couple of thoughts provoked by the conference presentations.

2. WHY A CONFERENCE ON GATEWAYS AND CORRIDORS?

If one presentation slide captured the current intensity of interest in gateways and corridors, it is a slide (see figure 1) indicating the truly spectacular growth in throughput of containers in Mainland China over the last 25 years [Zan]. This staggering growth in volume of international trade, particularly flows of commodities to and finished goods from China, have put tremendous pressure on Marine ports in North America and beyond. The ensuing congestion at ports such as Vancouver - Canada’s pacific gateway - has lead the Canadian government to develop a national strategy to address the need for a transportation network capable of handling increasingly high volumes of cargo. In Western Canada, this strategy is being implemented as ‘Canada’s Asia-Pacific Gateway and Corridor

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1 Interested readers can find the abstracts and original papers and/or presentations for this conference and other related roundtables at http://www.gateway-corridor.com.
Initiative’. The perceived importance of the Pacific Gateway Initiative by the Canadian Government was punctuated at this Vancouver conference by the attendance of Canadian Prime Minister Steven Harper, who articulated the initiative as part of broader focus to improve the transportation network nationwide.2

The future appears to promise a continuation of the exponential trend as evidenced by the expansions planned and underway at the Shanghai Port and Yangtze River Pacific gateway [Y. Zhang]. However, China is not the only engine of growth for gateways and corridors. Around the world, infrastructure investments are being considered that will impact gateway and corridor capacities for decades into the future. In that future, India, Russia Brazil and other countries are likely to have increasingly significant impacts on the volumes and patterns of world trade [Brooks].

There is massive congestion and pressure on gateways and corridors all across North America, driven by the dramatic current and projected increases in cargo flows emanating from China. It is not just about China though: India, Russia, and Brazil amongst others will be an increasing part of the future equation.

Figure 1: Throughput of container cargo in mainland China, 1981-2006

Source: Y Zan: Development of Gateways and Corridors in China.3

2 The Prime Minister’s address to conference participants can be found at http://www.pm.gc.ca/eng/media.asp?id=1645
3 Presentation, International Conference on Gateways and Corridors, Vancouver, 2007
3. THEORETICAL ANALYSIS OF GATEWAYS AND CORRIDORS

What are gateways and corridors? They are the nodes (marine ports and airports) and links (roadways, railways and air transport routes) in a transportation network. Are all the nodes in a network also gateways? One definition of a gateway provided by Parsons et al (2007), suggests that gateways are nodes that have a fertile region on one side (where people can reside and commerce can develop) and an infertile region on the other, such as an ocean. In this regard gateways are different than hubs, which are surrounded by a fertile 'hinterland'. This can have an effect on the size and development of the city that supports a gateway relative to a city that supports a hub and has implications for the degree to which local or proximate regional demand can support the operations of a port. Related to this is the possibility that in either case (gateway or hub) governments may seek to build corridors specifically to extend economic growth to more distant points in the hinterland [Pain, Vickerman]. Thus the distinction between gateways and hubs can be important. However, in a theoretical analysis of gateways, there are also instances where hubs should be included in the analysis because gateway nodes and hub nodes can compete with one another. The analytical importance of this is made clear when one recognizes that transportation networks include air as well as marine transport and that airports can be either gateways or hubs. So for example, air corridors connect Chinese hubs and gateways with Vancouver airport (a gateway) and Toronto airport (a hub), creating the potential for competition between Vancouver and Toronto.

The complexities of gateway and corridor development involve a great deal of strategic competition not only at inter-government and gateway levels, but also at the level of individual firms. In this context, we need to understand not only the technical importance of scale economies and capacity choice but also their strategic importance [Czerny, A. Zhang]. In addition, the recognition that corridors extend beyond jurisdictional boundaries gives rise to the analytical problem of non-natural frictional costs along transportation corridors. Border effects are real and significant and have implications for gateway competition and development [Hazeldine, Prentice]. If a gateway is developed because of a border rather than through natural economic evolution, its competitive position and strategies become bound up with the frictional costs that occur on corridors that cross the border. Consequently if those frictions are reduced or eliminated, the gateway will become subject to the competitive pressures it was previously insulated from. If border congestion is reduced between British Columbia and Washington State, the intensity of competition should increase between gateways in Seattle and Vancouver and between West-East corridors in the US and Canada.

We need more analytical models of transportation networks to provide a structured understanding of the complex inter-relationships between the nodes (gateways and hubs), links (corridors) and jurisdictional borders combined with strategic competition in transportation networks.
4. THE CURRENT SITUATION

As mentioned in the introduction, the stylized facts concerning the growth in global trade and transportation lead to timely and important questions regarding congestion and the physical capacity of gateways and corridors. However this is only one element in the evolution of global manufacturing and supply chains. There are at least three other key elements to consider: the reliability of gateways and corridors and the associated intermodal interfaces [Cees, Heaver, Trethaway], System design for reducing lifecycle costs [Trethaway] and information systems linking origin-destination gateways and corridor operations [Chow, Delfman, Trethaway].

In the development of global supply chains, value is created through cost efficiency and reliability, with perhaps more emphasis on the latter; depending on the market power of competitors (can higher costs of reliability be passed onto customers)? It is possible for the capacity of a gateway to be enhanced without adding physical capacity. Throughput can be improved by reducing intermodal frictions (this perhaps means adding capacity near the gateway; the addition of inland terminals for example). There is potential and a need to improve the intermodal interfaces at gateways and to lessen the frictions created by cargo flow imbalances (the empty container problem) [Heaver, Rodrigue]. In part, solutions will come from improving logistic systems software and eliminating steps in handling goods. It is interesting to note that while logistic service providers are a key source of added value in global supply chains, they are essentially free of physical assets. The trend toward the use of third-party logistic providers (3PLs) is likely to develop into an increasing amount of customization and so successful gateway-corridor networks will be the ones that can accommodate customized logistic solutions. Thinking from the perspective of the consumer forces us to consider the ‘delivered price’ of transported goods and services. There is evidence currently, competing gateway-corridor combinations offer delivered prices that are subject to enough variability that no single combination is preferred by the customer (Shanghai-Toronto via Vancouver versus Halifax for example) [Chow, Brooks]. Consequently, if this situation does not change, the addition of physical capacity to gateways and corridors will not guarantee future business. If we build it, they might come but they might not stay!

Technology is driving the value-added components of logistics by reducing frictions and increasing reliability along the supply chain. Global supply chains are about value-added logistics services rather than volume per se. Delivered prices (which include all frictional costs in the supply chain) are what motivates business decisions. Currently, competing delivered prices are subject to variability when comparing different gateway-corridor combinations, so that no one gateway-corridor is consistently preferred.

5. SOCIAL WELFARE AND THE ROLE OF GOVERNMENTS

The Federal Government in Canada is developing a ‘system-wide’ approach to the economic development and operation of gateways and corridors, which involves federal-provincial-municipal government coordination, combined with public-private partnerships [Bohunicky]. By contrast, the US approach appears to be more
devolved to local or regional decision-makers, at least in the case of marine port policy [Bohnert]. What is not clear at this juncture is the degree to which Canadian and US gateways and corridors act as substitutes or complements [Lindsey].

The Canadian transportation network can compete and/or complement the system of gateways and corridors in the US. There are significant frictional costs on corridors within Canada (inter-provincial frictions) and between Canada and the US. The Canadian Federal Government is taking a system-wide approach to the transportation network while US policy appears to be more devolved to independent regional or local decision-making.

**Infrastructure investment**

On the issue of infrastructure investment and the selection of costly and potentially risky infrastructure projects, existing evidence indicates a tendency for cost-benefit calculations to suffer from ‘optimism’: a bias towards accepting projects. This has occurred partly because of inaccurate demand forecasts, neglecting to assign opportunity costs of inputs in input/output models and failure to consider the strategic responses of competitors [Lindsey, Forsyth]. Given that the technical ability to develop good computable general equilibrium (CGE) models now exists, policy makers should be employing CGE models in order to better understand the overall effects of large infrastructure investments [Forsyth].

There is evidence that in the selection of transportation infrastructure investments, cost-benefit calculations can be subject to ‘optimism’ due to inaccurate forecasts and inadequate attention to the opportunity costs of resources required. After projects have been selected, regulatory friction can slow the implementation of infrastructure investments which can result in lost or opportunities.

**Social costs and benefits of capacity investments**

On the cost side of net social welfare calculations, some current evidence is that social costs of infrastructure investments in gateways and corridors are likely to be significant, due not only to time costs associated with local gateway city congestion but also private fuel costs, greenhouse gas emissions and increased accident rates [Berechman]. On the benefit side, the social welfare created by an expansion of capacity could be small, because value and welfare is created by the interaction of supply (which is shifted out by an addition of capacity) and demand. For this reason, congestion problems cannot be completely addressed by adding capacity - some form of congestion pricing is required [Lindsey]. The geographic and urban diversity of gateways around the world suggest that moves to expand or enhance gateways and corridors will have uneven local and regional social costs [Pain]. Furthermore, it is important to include the security costs of reducing or preventing crime, terrorism and health risks because these considerations affect how we design and expand the system [Purdy]. Lastly, the future is likely to involve increased pressures to reduce the environmental impacts of transportation, therefore environmental concerns are likely to constrain or at least influence the manner in which gateways and corridors develop. An interesting example of this is
the comparatively low environmental impact of inland waterways and barges compared to alternative modes [Bohner].

The current impetus is to expand the capacity of gateways and corridors, however adding capacity do not guarantee socially efficiency; congestion pricing is required. Congestion pricing has to be part of the equation if only because of the environmental impacts of growing global transportation networks - there is a need for international coordination here.

All relevant social costs should be included when considering capacity investments in gateways, including security costs which are part of the social costs of network design and expansion. International comparisons of gateway and corridor expansions suggest that variations in urban and regional geographic and economic characteristics will create an uneven distribution of social costs and competitive advantages

Governance

The form of governance for large infrastructure projects is also important, with Canada's government currently favouring public-private partnerships (P3's). The evidence on P3's is mixed and suggests that governments should not regard one form of governance as dominant across all projects. The problem arises because of the interaction of public goods characteristics such as project risk and system integration (which might be underprovided by private interests) with the ability and incentives for cost efficiency that can emanate from private sector competition. The problem becomes more complex when one recognizes the transactions costs associated with projects that have a high degree of asset specificity [Boardman and Vining]. No matter how competitive the bidding process is for a large specific project, once a winning bid is chosen and the contract signed, the relationship becomes a bilateral bargaining situation with scope for ex-post opportunistic behaviour. Proponents of P3s have perhaps tended to focus on technical efficiency arising from private enterprise and economies of scale without factoring in the full transaction costs of implementing a P3 contract.

Governance problems extend to the operation of gateways but there is no uniquely superior governance model. Privatization plus incentive regulation has become a common form of governance but this can result in either incentives for ‘goldplating’ (under rate-of-return regulation) or underinvestment (with price-cap regulation) [Forsyth]. Another option is the governance structure of not-for-profit local authorities currently employed for Canadian airports. However this governance structure also suffers from incentive problems and has given rise to a complex debate concerning the appropriate rate of return to the Crown for its investment in and ownership of port land and assets.

There is no clear-cut solution to governance and regulation related to infrastructure investment in and operation of gateways and corridors. Public-private partnerships (“3Ps”) are subject to the transaction costs that accompany large asset-specific investments. Privatization can result in either over or under-provision of investment, depending on the accompanying regulation (cost-based, price-cap).
Network properties and gateway/corridor development

There is some evidence that small changes to corridors can have big impacts on the network. An example of this is the Sarnia tunnel project, which led to an increase in TEUs from 13,509 in the year prior to the tunnel opening, to 38,724 in the first year of operation, rising to 91,747 over a ten-year period [Brooks]. This sort of evidence is both interesting and troubling because it suggests that transportation networks have non-linear properties giving rise to threshold effects. One implication is that the development of gateways and corridors is likely to be history-dependent. Small changes made today will create potentially unanticipated impacts that will force the direction of future development.

There is evidence that small investments in corridors can cause big effects in the overall network. This suggests the possibility of non-linear relationships in transport networks (existence of threshold effects for example) and points to potential problems if infrastructure investments are made in isolation.

Accountability and Oversight

There is a clear concern that more transparency and accountability is required whether in specific cases - concerning the reliability of rail car service supply for example [Heaver] or more generally with respect to the need for a coherent and consistent marine port policy in Canada [Brooks]. One related implication is the need for better ways of measuring and benchmarking performance. Clearly a better understanding of the sources of productivity and efficiency at a port has value for both commercial and government decision-makers. In the case of marine ports facing particular market realities, accurate measurement of port performance and productivity can help determine the right competitive strategy [Dresner]. However defining and measuring performance is not an easy task, for example, the measured productivity of a marine port can vary significantly depending on the particular methodology employed [Oum and Tongzon].

Measuring port performance and pinpointing sources of efficiency is important for both commercial and governmental aspects of gateways. This is a difficult task though: different methodologies can provide different indications of performance.

6. SOME CONCLUDING THOUGHTS

Let me conclude by offering two thoughts based on the issues as summarized above. First, the evolution of global businesses and supply chains and the realization that value is created by developing reliable and cost efficient transportation networks should give us pause for thought. The successful development of gateway-corridor-hub networks depends crucially upon focusing on those elements that create the most value (both private and social). Many marine ports and airports around the world are expanding physical capacity and are positioning themselves to compete for cargo or passenger volumes. It, is not clear that this alone will generate value - certainly not for all competitors. At least one part of Canada's system-wide strategy should be to develop human capital capable of creating the information systems and computer-driven technologies
that will be in global demand as the means to improve supply chains and lower transportation costs. To increase our human capital in this area requires an investment in education programs to develop both technical and management expertise in transportation logistics and supply chains.

Second, the interface between multiple levels of government and the private sector creates a complex problem for governance, regulation and oversight. On the one hand, creating the right (social) incentives requires transparency, accountability and measurement, however the objectives of creating efficiencies and competitive advantages favours the commercial business focus found in the private sector. With respect to gateways, the danger lies in overarching regulation and the application of common legislative rules to marine ports and airports, which differ significantly in size, geographic market boundaries, the configuration of corridors connected to them and other elements of market structure. In this regard, I would argue that the desired conceptual structure for public policy should be that of a social franchise.\textsuperscript{4} Using the analogy of a franchise, the government acts as the ‘franchisor’, whose goal is to maximize the social value of the overall franchise (transportation network), while allowing individual ‘franchisees’ (gateways and hubs), the flexibility to make business decisions that suit their particular market circumstances. The franchise structure recognizes both vertical and horizontal incentive problems in the governance structure. The vertical incentive problem is to align the behaviour of a franchisee with the overall objectives of the franchisor, while the horizontal incentive problem addresses the potential for one franchisor’s actions to impact (positively or negatively) the welfare of other franchisees. This leads me to one last message:

\textit{There should be transparency and accountability in the governance of gateways and corridors. Government oversight should be coherent and consistent but must also allow for flexibility in commercial decision-making in order to promote dynamic competitive efficiency.}

In the attempt to summarize and draw together the themes and issues raised by over thirty conference presentations, this paper has developed ten messages concerning gateways and corridors.\textsuperscript{5} These were the messages as I received and interpreted them; no doubt they differ from the number and content of messages received by other conference participants. Of course there is always variation between the intended messages of the speaker and the messages actually received by the listener, but as with all intellectual discourse, discussion is created by the space between the message sent and the message received. Indeed, given the heterogeneity of education, training and professional orientation of those interested in gateways and corridors, some variance in interpretation is guaranteed. I have offered an economic perspective in the hope that readers can find common interdisciplinary themes and perhaps more easily define those areas where different approaches lead to divergent conclusions.

\textsuperscript{4} See Gillen and Morrison (2005)

\textsuperscript{5} In my attempt to reference certain issues to relevant presentations, I have no-doubt (unintentionally) neglected to reference some authors’ presentations. For this I apologise in advance.
TEN MESSAGES CONCERNING GATEWAYS AND CORRIDORS

1. There is massive congestion and pressure on gateways and corridors all across North America, driven by the dramatic current and projected increases in cargo flows emanating from China. It is not just about China though: India, Russia, and Brazil amongst others will be an increasing part of the future equation.

2. We need more analytical models of transportation networks to provide a structured understanding of the complex inter-relationships between the nodes (gateways and hubs), links (corridors) and jurisdictional borders combined with strategic competition in transportation networks.

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6. There is no clear-cut solution to governance and regulation related to infrastructure investment in and operation of gateways and corridors. Public-private partnerships (“3Ps”) are subject to the transaction costs that accompany large asset-specific investments. Privatization can result in either over or under-provision of investment, depending on the accompanying regulation (cost-based, price-cap). There should be transparency and accountability in the governance of gateways and corridors. Government oversight should be coherent and consistent but must also allow for flexibility in commercial decision-making in order to promote dynamic competitive efficiency.

7. The current impetus is to expand the capacity of gateways and corridors, however adding capacity does not guarantee socially efficiency; congestion
pricing is required. Congestion pricing has to be part of the equation if only because of the environmental impacts of growing global transportation networks – there is a need for international coordination here.

8. All relevant social costs should be included when considering capacity investments in gateways, including security costs which are part of the social costs of network design and expansion. International comparisons of gateway and corridor expansions suggest that variations in urban and regional geographic and economic characteristics will create an uneven distribution of social costs and competitive advantages.

9. There is evidence that small investments in corridors can cause big effects in the overall network. This suggests the possibility of non-linear relationships in transport networks (existence of threshold effects for example) and points to potential problems if infrastructure investments are made in isolation.

10. Measuring port performance and pinpointing sources of efficiency is important for both commercial and governmental aspects of gateways. This is a difficult task though: different methodologies can provide different indications of performance.

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CONFERENCE PRESENTATIONS

Berechman W, Social costs of global gateway cities: The Port of New York
Boardman A. and Vining A., Can P3s contribute to the upgrade of Canada's Asia-Pacific trade infrastructure?
Bohnert R., Congestion and US Gateways and Corridors
Bohunicky B., Canada's Asia-Pacific Gateway and Corridor Initiative and future gateway strategies
Brooks M., Gateways and Canada's ports policy, issues and impediments
Chen H., The evaluation of China's reform on aircraft landing pricing and its role to Shanghai Pudong Airport as an international gateway
Chow G., Collateral benefits of security and supply chain improvements at international gateways
Colledge D., The costs of supply chain, congestion, disruption and uncertainty
Comtois C., Marketing green logistics, environmental strategies for transportation based gateways and corridors
Czerny A., Gateways and intermodal pricing
Delfmann W., *The changing role of gateways in the context of global value chain dynamics*

Dresner M., *Assessing productivity and performance of seaports, The importance for gateways*

Forsyth P., *Investing in transport infrastructure, institutional design and efficiency*

Hall P., *Global logistics and local dilemmas*

Hazledine T., *How high is the gate? A study of the border effect at five major Canadian airports*

Heaver T., *Tying it all together, The challenge of integration in and through gateways*

Hirshhorn R., *Port Policy and the Asia-Pacific Gateway and Corridor Initiative*

Lindsey R., *Infrastructure capacity, pricing and gateway competition*

Oum T. and Tongzon J., *The role of port performance in gateway logistics*

Pain K., *Gateways and corridors in globalisation, planning sustainable infrastructures for transcontinental 'Spaces of Flows'*

Prentice P., *Pacific Crossroads, An introduction to issues of the Asia-Pacific Gateway*

Purdy M., *Gateways and Corridors, Assessing and addressing strategic security concerns*

Rodrique J-P., *Corridors and the maritime / land interface, North America and the Pacific*

Ruijgrok C., *The development of international freight transport in Europe as a result of developments in international trade and logistics*

Tretheway M., *Gateway and corridor performance, what is important?*

Vickerman R., *Gateways, corridors and competitiveness, an evaluation of trans-European networks and lessons for Canada*

Zan Y., *Development of Gateways and Corridors in China*

Zhang A., *Port pricing and governance in congestible gateways and corridors*

Zhang Y., *Competitiveness of Shanghai Port and Yangtze-River-Pacific-Ocean Gateway*

BIBLIOGRAPHY

Gillen D. and Morrison, W., 2005, *The economics of franchise contracts and airport policy*, Journal of Air Transport Management, 11(1)